

NAMRL - 1288

TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS:

I. ACUPRESSURE; II. REPEATED EXPOSURE

J. Michael Lentz



December 1982

NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY
PENSACOLA FLORIDA

Approved for public release; distribution unlimited

83 04 27 008

DTIC FILE COPY

AD A127327

Approved for public release; distribution unlimited.

TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS:

I. ACUPRESSURE; II. REPEATED EXPOSURE

J. Michael Lentz

Naval Medical Research and Development Command
MF 58524005-7032
M0096001-1045

Reviewed by

Ashton Graybiel, M.D.
Chief Scientific Advisor

Approved and released by

Captain W. M. Houk, MC, USN
Commanding Officer

10 December 1982

NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY
NAVAL AIR STATION
PENSACOLA, FLORIDA 32508

SUMMARY PAGE

THE PROBLEM

These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test.

FINDINGS

The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory "provocative" test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing.

Data from a set of unselected subjects in Experiment II indicate a statistically significant reduction in rater and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.

ACKNOWLEDGMENTS

The author expresses appreciation to Dr. Daniel S. J. Choy for providing wrist straps and instructions for application and to HM2 Jim Catrett, HM2 Kelita Dixon, and Mr. Joel Norman for subject testing.

Accession	
NTIS	
DTIC	
Unannounced	
Justified	
My	
Dist	
Avail	
Dist	

Dist **A**



EXPERIMENT I. PILOT STUDY INVESTIGATING EFFECTIVENESS OF AN ACUPRESSURE METHOD TO PREVENT LABORATORY-INDUCED MOTION SICKNESS

INTRODUCTION

Recently there has been popular discussion of an acupressure method for preventing seasickness which involves application of pressure to the 'NEI-KUAN' point. Informal reports (2) have indicated that the acupressure wrist straps were effective in inhibiting nausea and/or vomiting associated with radiation therapy, chemotherapy, anorexia nervosa, motion sickness, morning sickness, and Meniere's Syndrome. Since this procedure represents a possible simple technique in the treatment of motion sickness, we incorporated in our routine testing of airsick referrals a short test of the acupressure method.

METHOD

SUBJECTS

Twenty-four individuals suffering from repeated bouts of airsickness during flight training served as subjects. The subjects were all male, college graduates, in their early twenties. All subjects had been referred to the Vestibular Sciences Division for a general evaluation of vestibular functioning.

PROCEDURE

All subjects reported for testing on three consecutive days. Although several tests were administered on each day, only one nauseogenic test was used on any single day. The Brief Vestibular Disorientation Test (1) was administered on two consecutive days to provide an estimate of Day 1 to Day 2 improvement in test scores for airsick referrals and this also provided an opportunity to check effectiveness in these subjects of the acupressure method. The wrist straps were applied either in the correct position or in a 'sham' or incorrect position (Fig. 1) in a counterbalanced manner. In both conditions the entire wrist area was loosely wrapped with an elastic bandage to conceal the testing condition from the test observers. The corpsman who applied the wrist straps did not participate in rating the subjects' symptoms. Subjects were not provided information about claims that the buttons might influence symptoms of motion sickness.

A detailed description of the Brief Vestibular Disorientation Test procedure is reported elsewhere (1). Briefly, it involves passively rotating a seated subject at 15 RPM about his z-axis. The subject, with eyes closed, is asked to make a series of ten 45° head movements spaced at 30 sec intervals. As shown in previous reports (3), the resulting cross-coupled Coriolis stimuli induce motion sickness symptoms in many individuals. Immediately following the 10 minute test exposure, two or three observers rated the strength of motion sickness signs elicited in the test subject and the subject likewise rated his own symptoms. The observer ratings were based on a 10-point scale, with 1 indicating little or no effect and 10 a very strong effect. The rater items were: pallor, sweating, facial



Figure 1

Application of wrist straps: (a) wrist strap button placed three finger breadths above the wrist and between the flexor tendons; (b) correct placement; (c) 'sham' placement with pressure exerting button placed away from the arm; (d) loosely wrapped elastic bandages concealing wrist strap placement. In all instances the wrist straps were snugly applied to both wrists.

expression, unsteadiness, slow recovery, and overall reaction. The self-rate items were based on a 7-point scale with 1 indicating favorable or no reaction and 7 indicating extreme reaction. The self-rate items were: like/dislike, no stomach effects/strong stomach effects, no dizziness/strong dizziness, no sickness feelings/strong sickness feelings, and steady/very unsteady.

RESULTS

For ease of comparison the raw data are tabulated in two formats in Table I. The left side of Table I allows a quick comparison of acupressure and control conditions. Both the rater and self-rate scores were slightly higher (stronger symptoms) for the acupressure (Rater 23.24, Self-rate 21.46) vs. the control (Rater 22.01, Self-rate 20.83) condition. A t -test for related measures did not indicate a significant difference between conditions for either rater scores ($t=0.75$, p N.S.) or self-rate scores ($t=0.82$, p N.S.).

The same data are retabulated on the right side of Table I for an easy comparison of Day 1 to Day 2 without regard to testing condition. There was a slight decline from Day 1 to Day 2 in both rater scores (23.15 to 22.10) and self-rate scores (21.38 to 20.90), however, neither decline was statistically significant (Rater $t=0.64$, p N.S.; Self-rate $t=0.60$, p N.S.).

DISCUSSION

The results indicated that the acupressure treatment as applied in this study was not effective in reducing laboratory induced motion sickness symptoms. Several qualifications should be observed before one generalizes these results to other situations. First, one must realize that seasickness due to its constant inescapable stimulus conditions is somewhat different from the short and intense laboratory induced sickness generated in the current study. Second, it is possible that in the current study the wrist bands were misaligned or did not maintain the appropriate tension to effectively stimulate the 'NEI-KUAN' point, however, the straps were applied as per instructions (2) by a qualified Navy corpsman under the supervision of the investigator. Thirdly, an attempt was made in the current investigation to avoid any placebo effect that might be associated with the suggestion that the straps have been effective against motion sickness in the past. A fourth factor to be considered is the possibility that the individuals tested may have been different from the average airsick or seasick individual. However, previous data (3) indicate that the observer ratings for this airsick group were quite comparable to those obtained in an earlier study of 47 airsick flight personnel (Mean Rater Score of 23.53). Whether these results can be generalized to seasickness conditions is an unanswered question. The duration and intensity of stimuli which result in airsickness vs. seasickness have not been compared and it is possible that the average airsick individual is not representative of the average seasick individual. In fact, it is well known that some individuals who occasionally suffer from seasickness have rarely experienced airsickness. The results from the following study also suggest that airsick individuals may react differently than other groups (i.e., nonselected) to repeated exposures to nauseogenic stimuli.

TABLE I

PILOT STUDY INVESTIGATING EFFECTIVENESS OF AN ACUPRESSURE METHOD TO
PREVENT LABORATORY-INDUCED MOTION SICKNESS

Subject	ACUPRESSURE CONDITION		CONTROL CONDITION		WITHOUT REGARD TO CONDITION				
	Mean Rater	Self Rate	Mean Rater	Self Rate	DAY 1 1st Cond	Mean Rater	Self Rate	DAY 2 Mean Rater	Self Rate
1	24	31	27	27	C	27	27	24	31
2	19	22	28	23	C	28	23	19	22
3	39	28	27	25	A	39	28	27	25
4	16	20	14	19	A	16	20	14	19
5	30	28	40	23	A	30	28	40	23
6	34	30	15	27	C	15	27	34	30
7	32	31	18	28	C	18	28	32	31
8	37	29	31	24	A	37	29	31	24
9	44	24	40	27	A	44	24	40	27
10	13	12	23	20	C	23	20	13	12
11	19	21	17	20	A	19	21	17	20
12	26	17	24.5	14	A	26	17	24.5	14
13	16.3	26	34.7	31	C	34.7	31	16.3	26
14	17.3	9	17.3	9	C	17.3	9	17.3	9
15	23	30	14.5	24	C	14.5	24	23	30
16	22.3	17	18.5	18	A	22.3	17	18.5	18
17	21.3	17	19.7	18	A	21.3	17	19.7	18
18	26.5	28	24	21	C	24	21	26.5	28
19	22	15	26	18	C	26	18	22	15
20	14.5	12	12	13	A	14.5	12	12	13
21	15	11	16	16	C	16	16	15	11
22	12	12	11.5	10	A	12	12	11.5	10
23	14	20	12.5	21	A	14	20	12.5	21
24	20.5	25	17	24	C	17	24	20.5	25
Mean	23.24	21.46	22.01	20.83		23.15	21.38	22.10	20.90
S.D.	8.78	7.20	8.38	5.68		8.75	5.90	8.42	7.03
<u>t</u> for related measures					<u>t</u> for related measures				
Rater $\bar{t} = 0.75$, p N.S.					Rater $\bar{t} = 0.64$, p N.S.				
Self rate $\bar{t} = 0.82$, p N.S.					Self rate $\bar{t} = 0.60$, p N.S.				

EXPERIMENT II. PILOT STUDY INVESTIGATING CONSECUTIVE DAY ADAPTATION TO THE BRIEF VESTIBULAR DISORIENTATION TEST

INTRODUCTION

This study arose due to two factors: 1) our desire to measure an individual's adaptative capabilities to repeated motion exposures, and 2) the results of the foregoing study which suggested that a repeat exposure to the nauseogenic Brief Vestibular Disorientation Test did not result in significant adaptation. This second finding was actually contrary to our previous experience with this test.

METHOD

SUBJECTS

Subjects for this study were 20 Aviation Officer Candidates (AOC) between the ages of 18 and 25. The subjects were randomly selected from the AOC pool and were not screened for a prior motion sickness history.

PROCEDURE

The testing procedure was identical to that in Experiment I with the exception that acupressure straps were not used.

RESULTS

The mean rater and self-rate scores for Days 1 and 2 are shown in Table II. There was a significant reduction in rater scores ($t=4.63$, $p < 0.001$) and self-rate scores ($t=2.17$, $p < 0.05$) from Day 1 to Day 2.

DISCUSSION

The statistically significant reduction in rater and self-rate scores from Day 1 to Day 2 agrees with our general experience on this test. The lack of a significant Day 1 to Day 2 adaptation in Experiment I might be due to the fact that all subjects in Experiment I were confirmed as highly motion sickness susceptible. The subjects in Experiment II were drawn from an unselected 'normal' population which included many individuals who were presumably not very susceptible. It is possible that low to moderately susceptible individuals may evidence a more rapid motion stress adaptation when compared to highly susceptible individuals. To further test this hypothesis, Experiment II should be repeated using only highly susceptible individuals with an extension of consecutive day testing to include three or four repeat tests. An alternative testing procedure which might be more palatable to the subjects would again involve repeat testing but with a less stressful stimulus.

TABLE II

PILOT STUDY INVESTIGATING CONSECUTIVE DAY ADAPTATION
TO THE BRIEF VESTIBULAR DISORIENTATION TEST

<u>SUBJECTS</u>	<u>DAY 1</u>		<u>DAY 2</u>	
	<u>MEAN RATER</u>	<u>SELF RATE</u>	<u>MEAN RATER</u>	<u>SELF RATE</u>
1	24	27	17.5	28
2	14.7	7	12.7	7
3	19.7	12	15.7	6
4	19	24	12.5	17
5	15.5	11	14.5	8
6	21	25	17	13
7	16	10	12	11
8	12.5	17	10	11
9	14.5	9	12	9
10	14	16	14.5	15
11	11	21	15	25
12	16	20	15	14
13	13.5	11	14.5	22
14	14.3	9	10	8
15	12.3	9	10	10
16	11.5	12	10.5	9
17	17.5	8	11.7	7
18	20.5	23	16.7	14
19	26	23	19.3	17
20	22	16	17	9
Mean	16.78	15.50	13.90	13.00
S.D.	4.27	6.53	2.80	6.17

t for related measures

Rater $\underline{t} = 4.63, p < 0.001$
Self Rate $\underline{t} = 2.17, p < 0.05$

BIBLIOGRAPHY

1. Ambler, R. K. and Guedry, F. E., Jr., A manual for the Brief Vestibular-Disorientation Test. Special Report 78-3. Pensacola, FL: Naval Aerospace Medical Research Laboratory, 1978.
2. Choy, D. S. J., Personal Communication, 1981-82.
3. Lentz, J. M. and Guedry, F. E., Jr., Motion sickness susceptibility: A retrospective comparison of laboratory tests. Aviation, Space, and Environmental Medicine, 49:1281-1288, 1978.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NAMRL-1288	2. GOVT ACCESSION NO. AD-A127327	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Two Experiments on Laboratory-Induced Motion Sickness: I. Acupressure; II. Repeated Exposure		5. TYPE OF REPORT & PERIOD COVERED Interim
7. AUTHOR(s) J. Michael Lentz		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Aerospace Medical Research Laboratory Naval Air Station Pensacola, Florida 32508		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Medical Research and Development Command National Naval Medical Center Bethesda, MD 20014		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS MF 58524005-7032 M0096001-1045
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 10 December 1982
		13. NUMBER OF PAGES 9
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Vestibular; Motion sickness		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals (over)		

DD FORM 1473
1 JAN 73EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Cont!!
Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory "provocative" test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rater and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.

11
Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NAMRL - PENSACOLA, FL: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rater and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>1962</p> <p>Lentz, J. M.</p>	<p>Vestibular Motion sickness</p>	<p>Vestibular Motion sickness</p>	<p>Vestibular Motion sickness</p>
<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NAMRL - PENSACOLA, FL: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rater and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>1962</p> <p>Lentz, J. M.</p>	<p>Vestibular Motion sickness</p>	<p>Vestibular Motion sickness</p>	<p>Vestibular Motion sickness</p>

<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NASEL - PENSACOLA, FL.: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rate and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>Vestibular Motion sickness</p>	<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NASEL - PENSACOLA, FL.: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rate and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>Vestibular Motion sickness</p>
<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NASEL - PENSACOLA, FL.: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rate and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>Vestibular Motion sickness</p>	<p>Lentz, J. M.</p> <p>1962</p> <p>TWO EXPERIMENTS ON LABORATORY-INDUCED MOTION SICKNESS: I. ACUPRESSURE; II. REPEATED EXPOSURE. NASEL - PENSACOLA, FL.: NAVAL AEROSPACE MEDICAL RESEARCH LABORATORY, 10 December.</p> <p>These experiments were part of a continuing effort to find motion sickness preventatives and explore methods for predicting individual adaptive capabilities. Experiment I is a pilot study investigating the effectiveness of an acupressure method to prevent laboratory induced motion sickness. Experiment II is a pilot study investigating consecutive day adaptation to a laboratory induced motion sickness test. The results from Experiment I indicated that the acupressure treatment as applied in this study to a group of airsick referrals was not effective in altering the signs and symptoms of motion sickness produced by a brief laboratory 'provocative' test. This group of subjects did not show a reduction in motion sickness scores from the first to the second day of testing. Data from Experiment II indicate a statistically significant reduction in rate and self-rate scores across consecutive day exposure to this nauseogenic laboratory test. Further testing will be necessary to determine why consecutive day adaptation was not evident in Experiment I. It is possible that a characteristic of airsick referrals like those in Experiment I is a slow rate of adaptation to early exposures.</p> <p>Vestibular Motion sickness</p>